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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/070,854	03/08/2002	Patrick Tortelier	28944/38284	2606
8968	7590	06/01/2005	EXAMINER	
GARDNER CARTON & DOUGLAS LLP ATTN: PATENT DOCKET DEPT. 191 N. WACKER DRIVE, SUITE 3700 CHICAGO, IL 60606			WANG, TED M	
			ART UNIT	PAPER NUMBER
			2634	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/070,854

Applicant(s)

TORTELIER ET AL.

Examiner

Ted M. Wang

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☒ Claim(s) 1 and 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/8/02.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities:
  - On page 5, line 1, change "for" to --- For ---.
  - On page 6, the brief description of the drawings, Fig.5d to Fig.5h, is missing.
  - On page 7, just before line 1, insert the heading --- MORE DETAILED DESCRIPTION ---.
  - On page 9, delete the heading --- MORE DETAILED DESCRIPTION --- previously amended by the preliminary amendment, dated March 8, 2002.. Appropriate correction is required.

### ***Preliminary Amendment***

2. The preliminary amendment filed on 3/8/2002 has been entered.

### ***Claim Objections***

3. Claims 1 and 2 are objected to because of the following informalities:
  - In claim 1, line 5, change "the" to --- a ---, line 28, change "the" to --- a --- before "trellis", line 36, and change "the" to --- a --- before "process".
  - In claim 1, line 20, insert --- : --- after "consisting" and move "in estimating each current bit  $x_n$  of the sequence of bits  $x = \{x_n\}$ " to line 21 before "in the sense of ...".
  - In claim 1, line 22, insert --- where the quadratic error function is --- after ",",.

- In claim 2, lines 9 and 10, replace “, which makes it possible to enhance the reliability of the method” with --- . ---.

Appropriate correction is required.

***Allowable Subject Matter***

4. Claims 1 and 2 would be allowable if rewritten to overcome the objection(s) set forth in this Office action.

5. The following is an examiner's statement of reasons for allowance.

- The prior art fails to teach an apparatus of Claim 1 that specifically comprises the following:
  - The instant application is deemed to be directed to a non-obvious improvement over the admitted prior art of the instant application and the invention patented in Pat. No. US 6,426,972, US 5,432,818, and US 5,265,105, and Joint equalization and decoding of trellis-encoded signals using the generalized Viterbi algorithm, Tortelier et al., Technology Conference, 2000 IEEE VTS-Fall VTC 2000, 52<sup>nd</sup> Volume 3, 24-28 Sept. 2000 Page(s):1221 - 1225, vol. 3. The improvement consists
    - in estimating each current bit  $x_n$  of the sequence of bits in the sense of the maximum likelihood by minimizing the quadratic error between observed symbol and current symbol at the channel output, where the quadratic error function is

$$\varepsilon^2(x) = (\sum |r_n - z_n|^2) = \sum |r_n - \phi(x_n; x_{n-1}; \dots; x_{n-L-k})|^2,$$

wherein, for any current symbol at the output of the channel  $z_n$  arising from the transmission, because of multiple paths, the successive sequence of the symbols arising from the coding process for the sequence of bits  $x = (x_n)$  corresponding to successive states  $e_{n-L}(x)$ ;  $e_{n-L+1}(x)$ ; ...;  $e_{n-1}(x)$  and finally  $e_n(x)$ , corresponding to branches between successive state nodes of the trellis of the code;

- in calculating said quadratic error on the basis of the set of observed symbols and of the successive state branches of the coding process, on the basis of the branch metric of the last transition  $e_{n-1}(x) \rightarrow e_n(x)$  of the coding process, according to the relationship:

$$\varepsilon^2(x) = \left( \sum |r_n - \{ \sum h_k \cdot y_{n-k} \}_{k \geq 0}|^2 \right) = \sum |r_n - h_0 y_n - \{ \sum h_k \cdot y_{n-k} \}_{k \geq 1}|^2$$

said branch metric being calculated by ascending the successive states at the level of each state node over a length equal to the memory of the channel;

- in inhibiting, the process of error propagation because of the calculation of the branch metrics, by memory-storage at the level of each node  $i$  and at each instant of a number  $S > 1$  of survivors, each survivor being defined by an accumulated metric  $M(i,t,k)$ , for the node  $i$  at the instant  $t$  for the survivor of ranking  $k$  in question,  $k \in (0, \dots, S-1)$ , and by an updating of each survivor at the instant  $t + 1$  for each node by calculation of a branch metric and selection of the  $S$  best branch metrics from among the set of possible branch metrics at the node in question; and

- in determining the final survivor with the smallest metric,

$M_m(0, \tau, 1)$ , and in reading the corresponding sequence of information bits,

by ascending successive state nodes.

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### **Conclusion**

7. Reference(s) US 6,426,972, US 5,432,818, US 5,265,105 and Joint equalization and decoding of trellis-encoded signals using the generalized Viterbi algorithm, Tortelier et al., Technology Conference, 2000 IEEE VTS-Fall VTC 2000, 52<sup>nd</sup> Volume 3, 24-28 Sept. 2000 Page(s):1221 - 1225, vol. 3 are cited because they are put pertinent to a method of decoding and joint equalization. However, none of references teach detailed connection as recited in claim.

8. This application is in condition for allowance except for the following formal matters:

**The specification and claim are objected by the examiner.**

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M Wang  
Examiner  
Art Unit 2634

Ted M Wang  
May 26, 2005



**SHUWANG LIU**  
**PRIMARY EXAMINER**